

## **A Survey of Riemannian Centres of Mass for Data**

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Riemannian barycentres are centres of mass defined for data which are best represented as points on nonlinear metric spaces (typically Riemannian manifolds, such as spheres). Because of the non-linearity, uniqueness of the barycentre can no longer be taken for granted, though much can be said about when uniqueness will hold. The subject has a surprisingly long history, stretching back to Fréchet and Cartan and indeed its origin is nearly contemporaneous with that of mathematical probability; however there has recently been a major resurgence of interest, fuelled by the need to deal with the intricate and geometrical structures of problems arising in modern data analysis. I shall discuss some applications (including statistical shape theory, fibre reconstruction from point patterns, and paths of hurricanes) and some underlying theory (which is now quite well-developed, including laws of large numbers and central limit theory, and which has led to a surprising retrospective look at the classical central limit theorem of Lindeberg and Feller).

Key Works: Barycentre, shape, fibre reconstruction.